Project of Interest
NextData - WP 2.6

Several meetings with researchers and technicians (also external to NextData) to define the characteristics of the General Portal

Web site ready

Calls for 2 AdR (post-doc fellowships), 2 Borse di Studio (post-master fellowships) and 1 Doctorate fellowship to contribute to the pilot studies

Project of Interest
NextData - WP 2.6

Pilot studies started in this period:

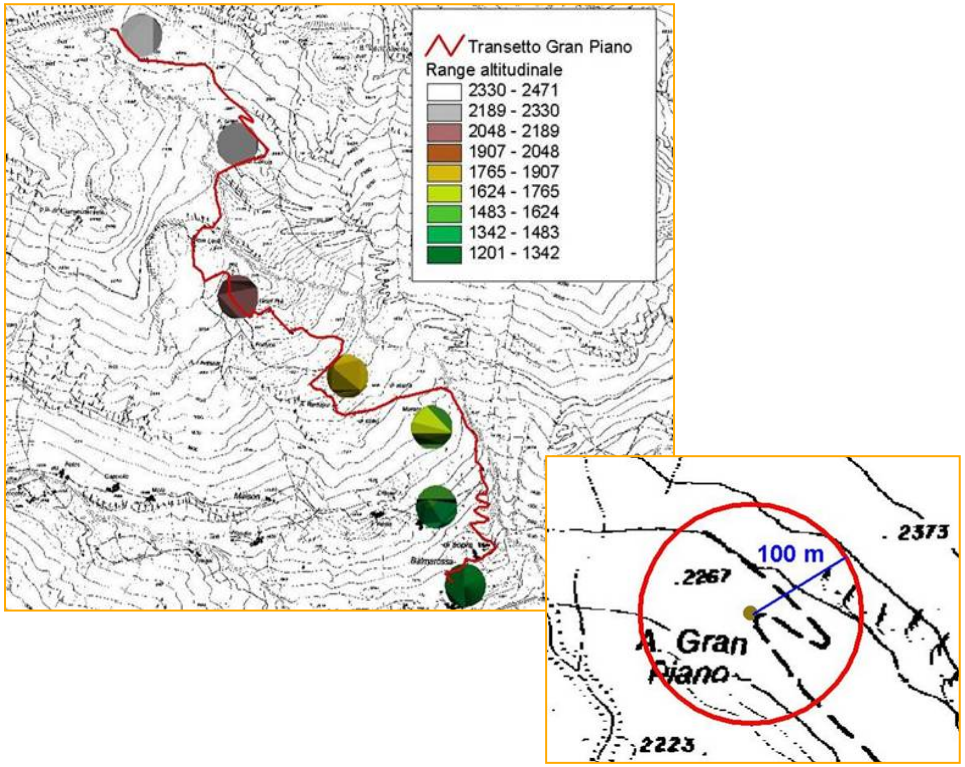
Water Resources in the Himalaya-Karakorum (HKKH)
and interaction between monsoon and mid-latitude disturbances
(resp. E. Palazzi, ISAC).

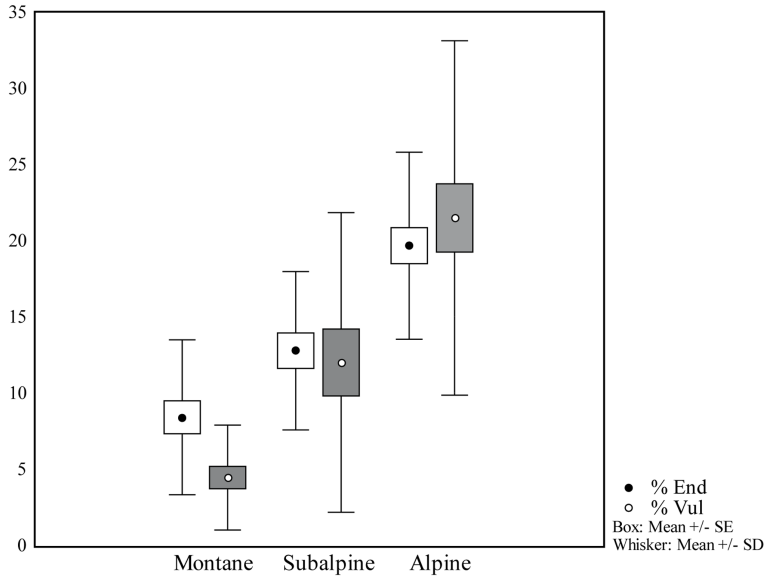
Analysis of terrestrial biodiversity and ecosystem changes
in high-elevation regions (resp. R. Viterbi, Gran Paradiso National Park).

Snow cover and hydrological cycle in the Alps and the Apennines.

Progetto di Interesse NextData - WP 2.6

Analysis of terrestrial biodiversity and ecosystem changes in high-elevation regions (resp. R. Viterbi, PNGP).





Water Resources in the Hindu-Kush Karakoram Himalaya (HKKH) and interaction between monsoon and mid-latitude disturbances

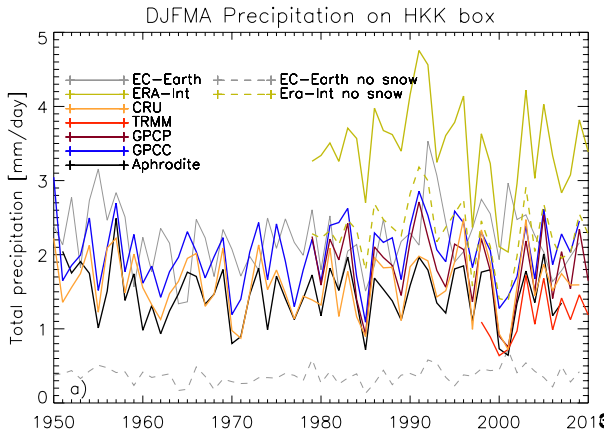
Pilot Study: WP 2.6

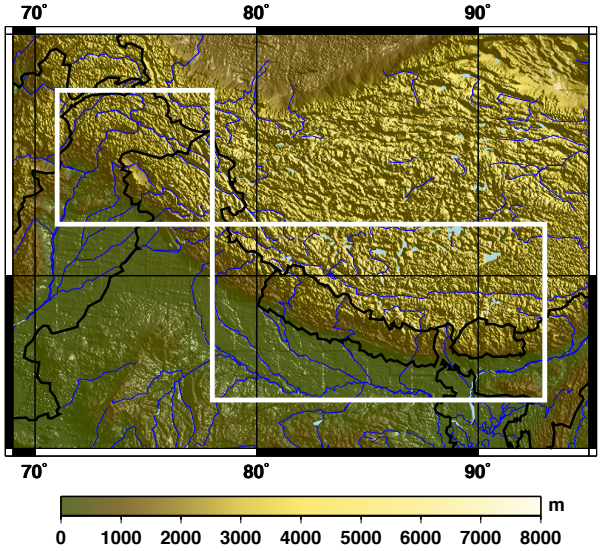
- **Precipitation climatology in the HKK and Himalaya**
  - Seasonality
  - Interannual variability
  - Trends
- **Assessments of the available precipitation datasets (obs., model)**
- **Future precipitation trends with the EC-Earth GCM**

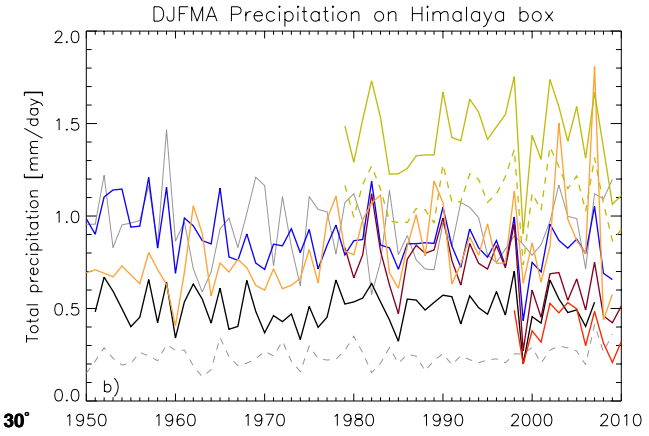
- **Preparatory to the analysis of WWPs**

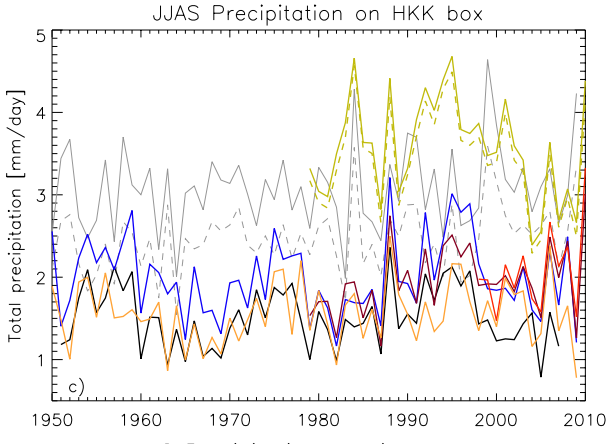
NextData
un sistema nazionale per la raccolta, conservazione, accessibilità e diffusione dei dati ambientali e climatici in aree montane e marine

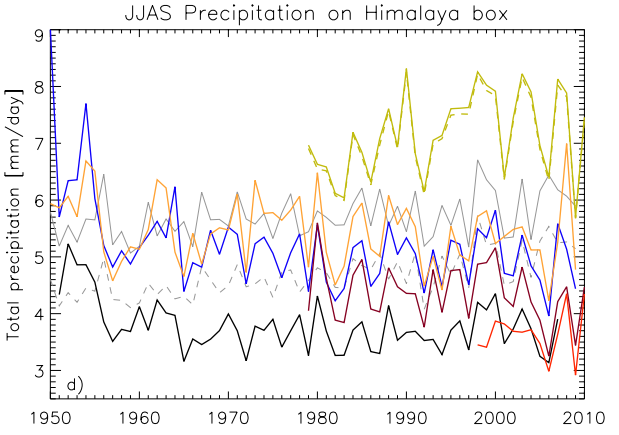
Water resources HKKH

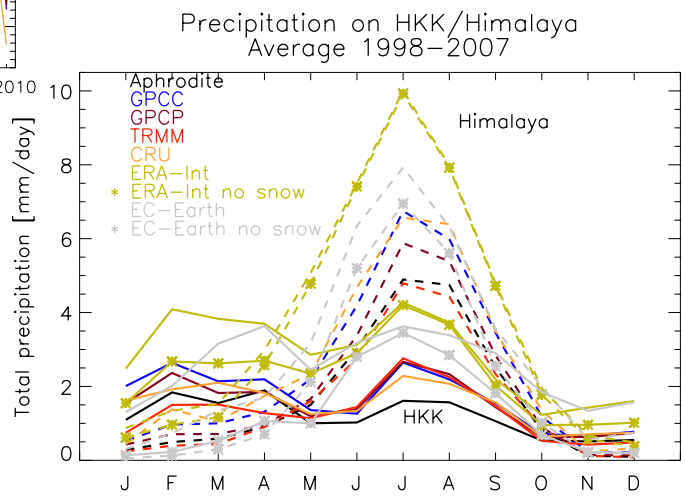






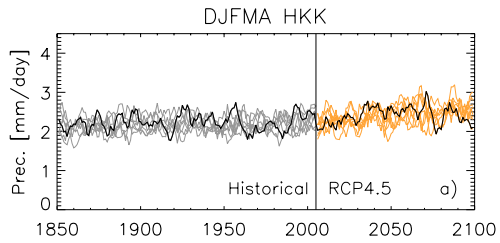


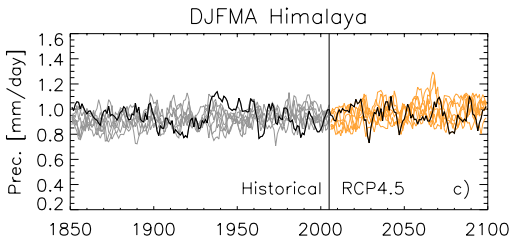


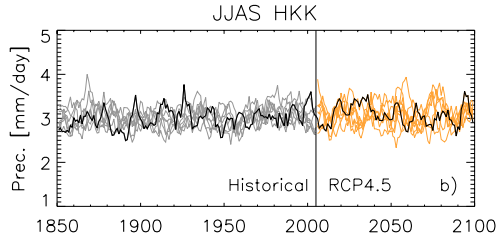


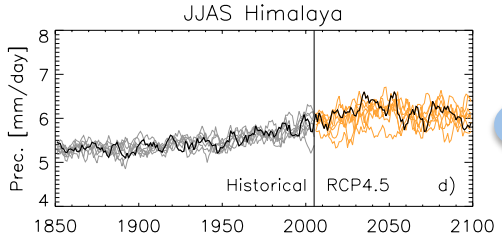
Himalaya, summer
Decreasing trend precip.
(Aphrodite, GPCC, CRU)

Water resources HKKH – EC-Earth scenarios



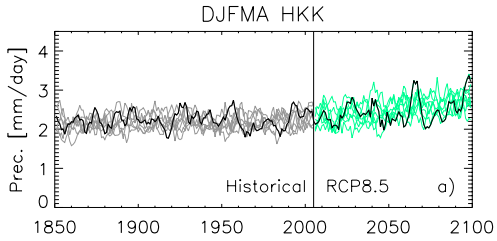


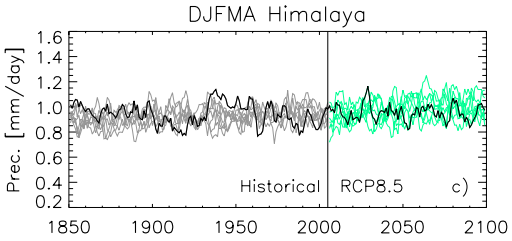


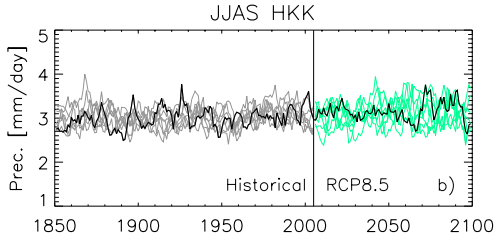


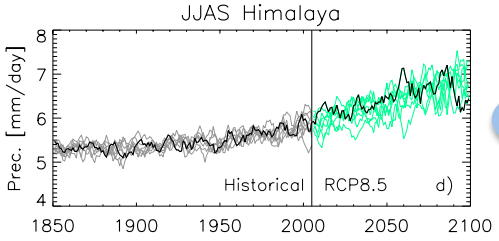
RCP 4.5

Himalaya, summer









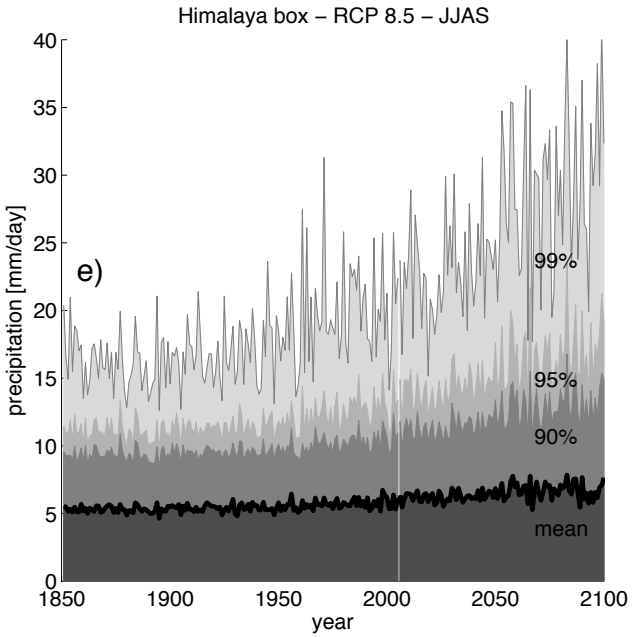
RCP 8.5

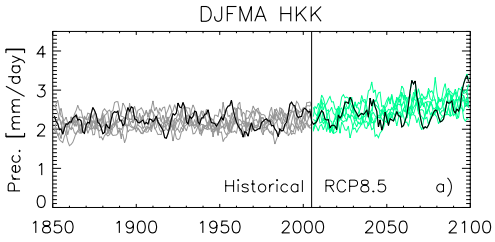
Himalaya, summer

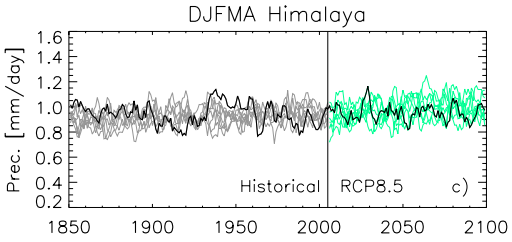
Water resources HKKH – EC-Earth scenarios

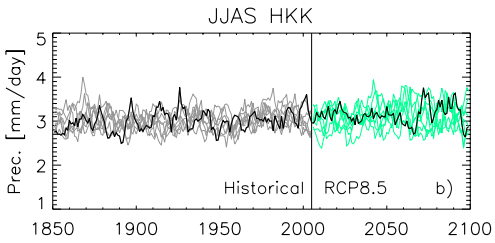
Increase in total precipitation →
- Precipitation extremes
- Precipitation intensity
- HY-INT index

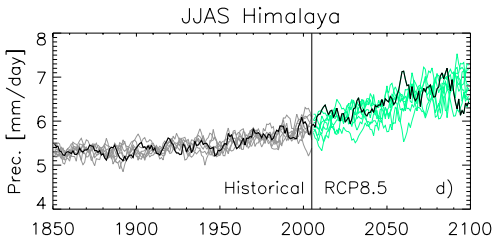
Decrease number of wet days

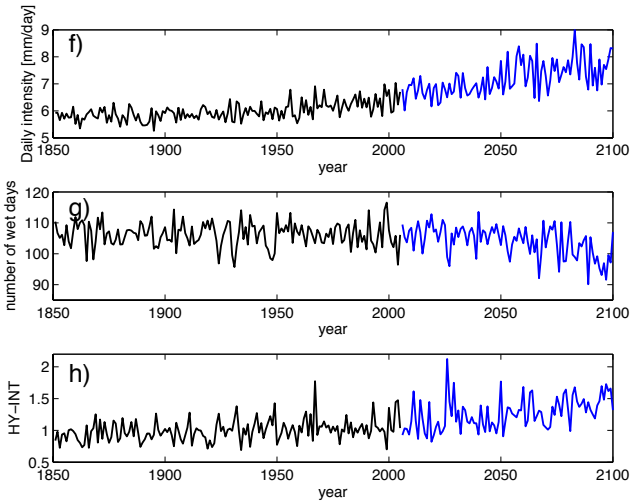












Stochastic downscaling of regional climate model data.

- **Obtain high-resolution climatic fields from smoother distributions on larger scales (GCM, RCM, global reanalyses)**

- **Compare downscaled fields with in-situ point data**

- **Understand the role of dynamical vs stochastic downscaling**

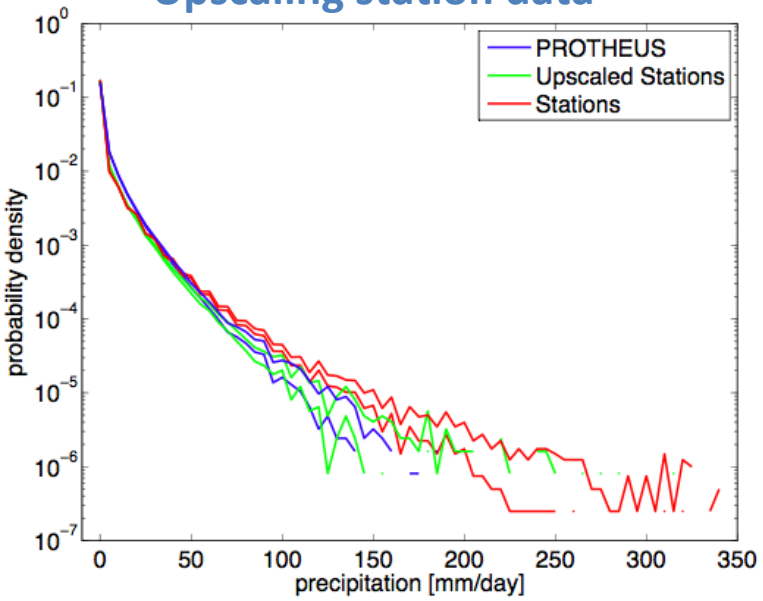
- **Generate high-resolution scenarios for the future decades**

- **Understand the effects of climate change on mountain environments**

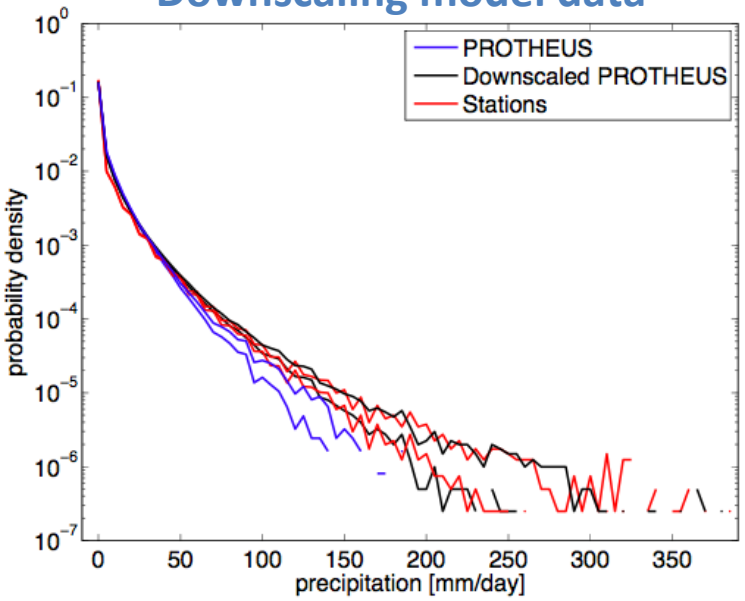
NextData
un sistema nazionale per la raccolta, conservazione, accessibilità e diffusione dei dati ambientali e climatici in aree montane e marine

Stochastic downscaling

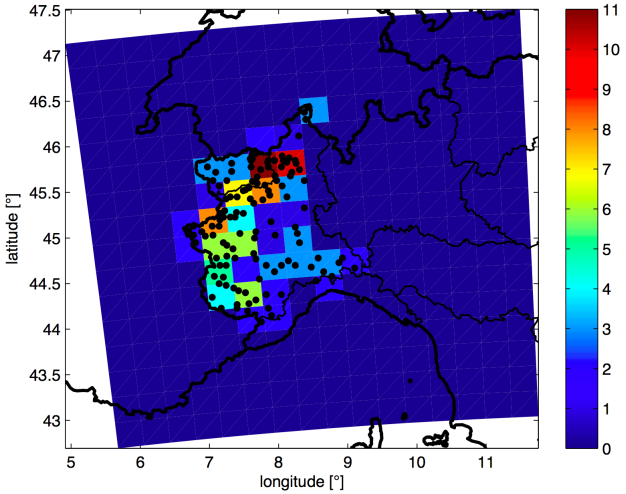
Upscaling station data



Downscaling model data

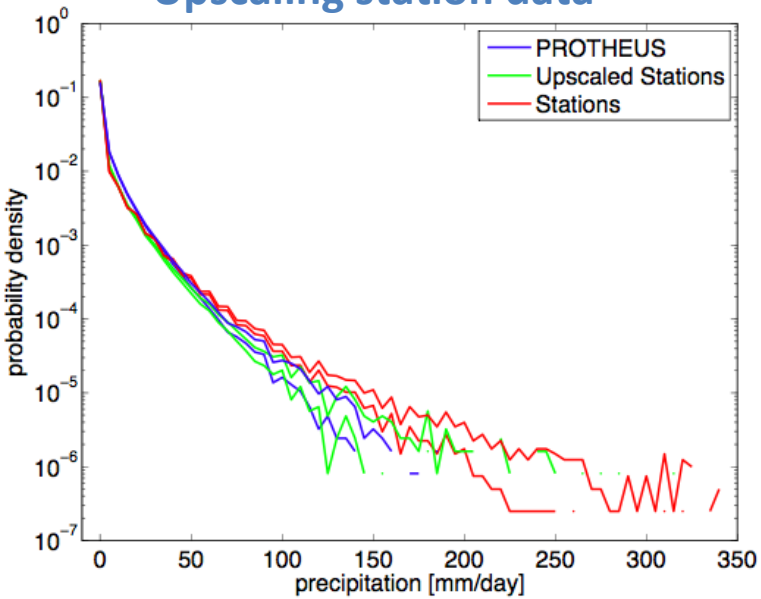


- **PROTHEUS RCM**
- **ERA40**
- **122 Rain gauges (Piedmont/Valle d'Aosta)**
- **RainFARM downscaling procedure**

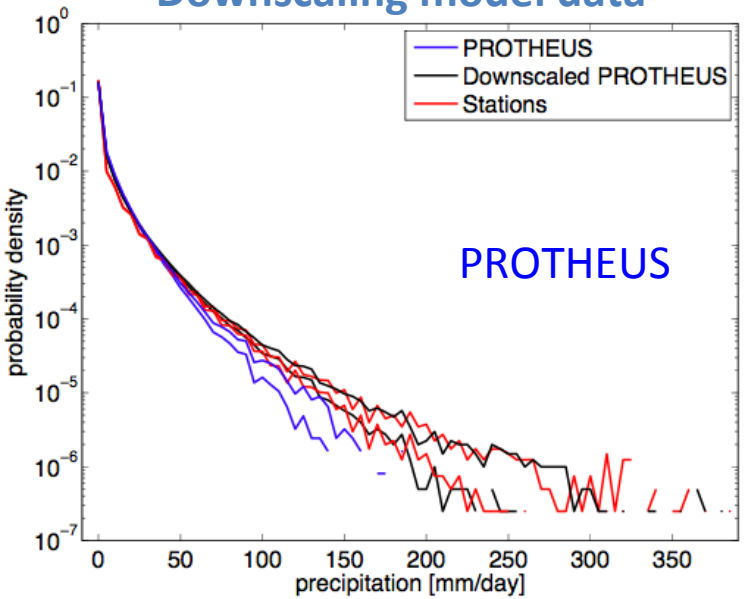


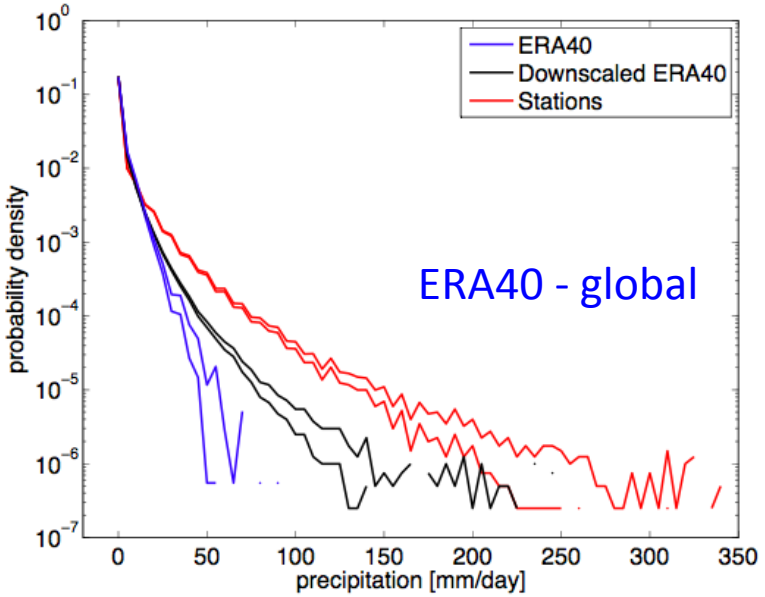
Stochastic downscaling

Upscaling station data



Downscaling model data





Estimation of changes in the hydrological cycle, snow cover and water resources in mountain areas

Pilot Study: WP 2.6

Outline

- Objective: snow depth modelling

- Exploration of EC-Earth snow depth dataset
  - Monthly climatology

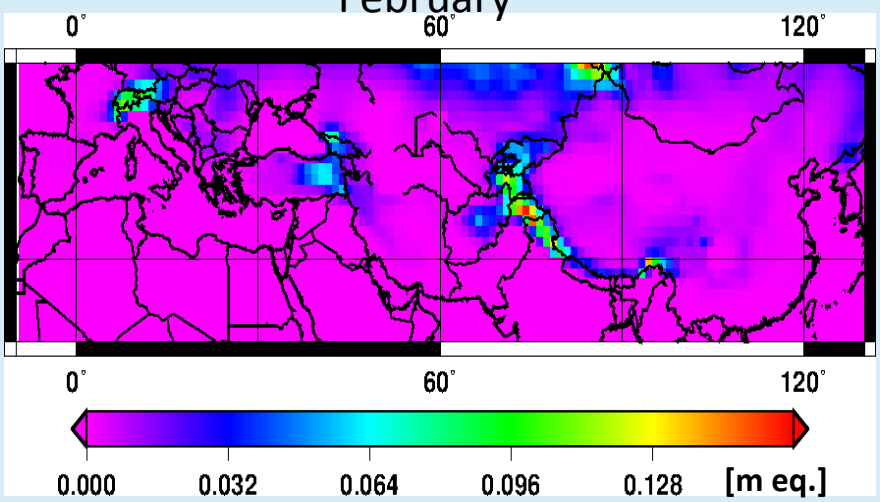
- Comparison EC-Earth vs. ERA-Interim snow depth

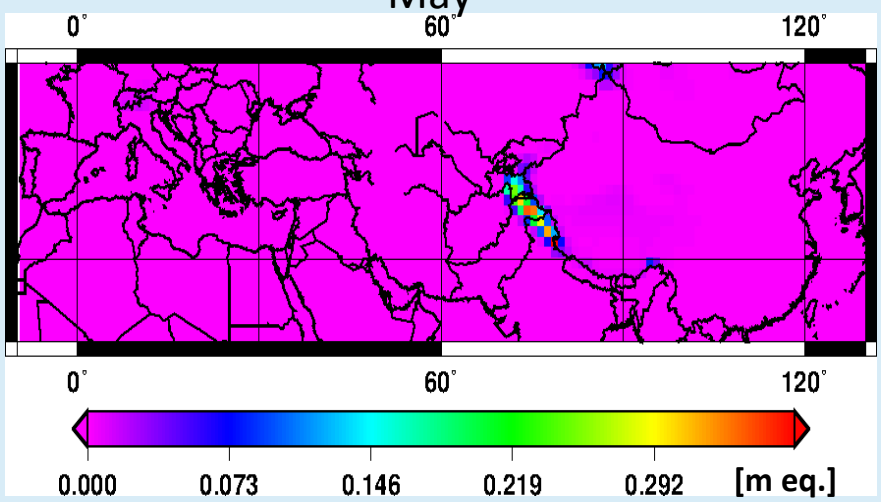
- Future work

NextData
un sistema nazionale per la raccolta, conservazione, accessibilità e diffusione dei dati ambientali e climatici in aree montane e marine

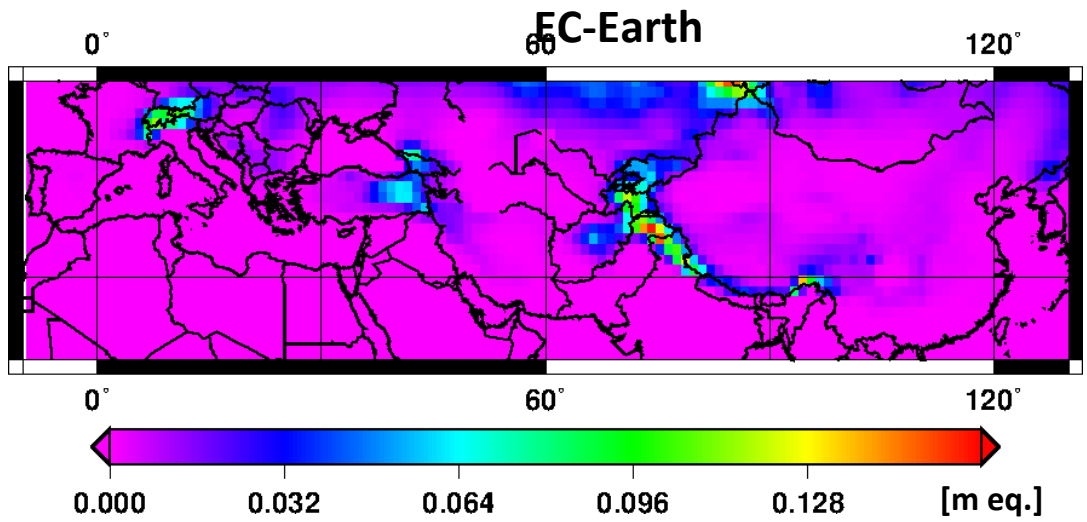
EC-Earth snow depth climatology

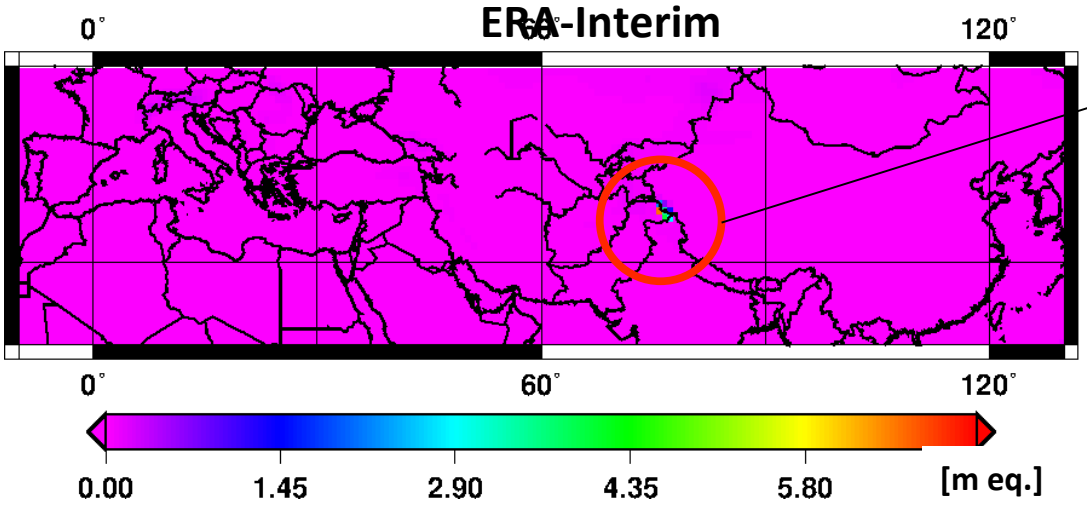
Area	Lon (-10°E, 130°W) Lat (20°N, 50°N)
Period	1979-2009
Variable	Snow depth [m water equiv.]
Datasets	EC-Earth, monthly means ERA-Interim (control) ECMWF Analysis (control)

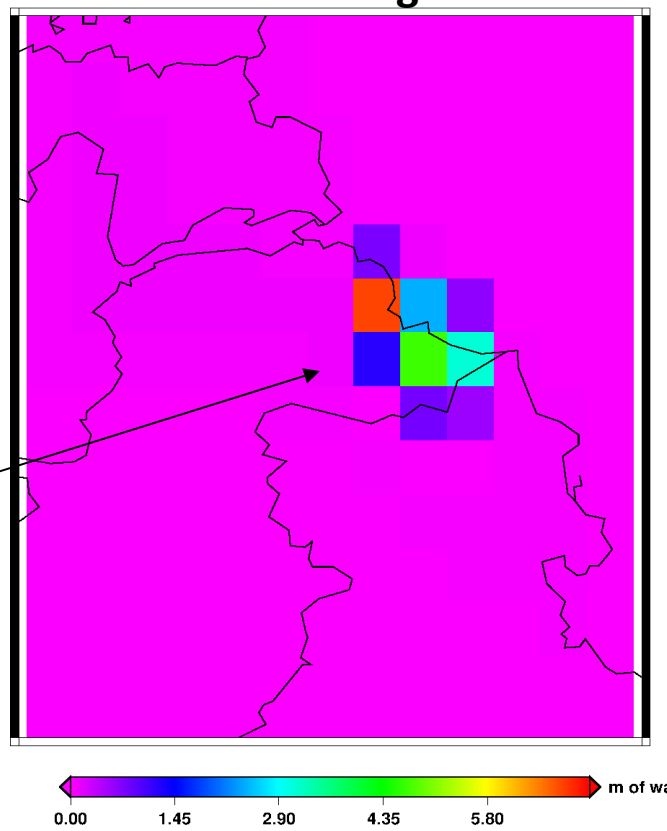




EC-Earth vs. ERA-Interim snow depth, January

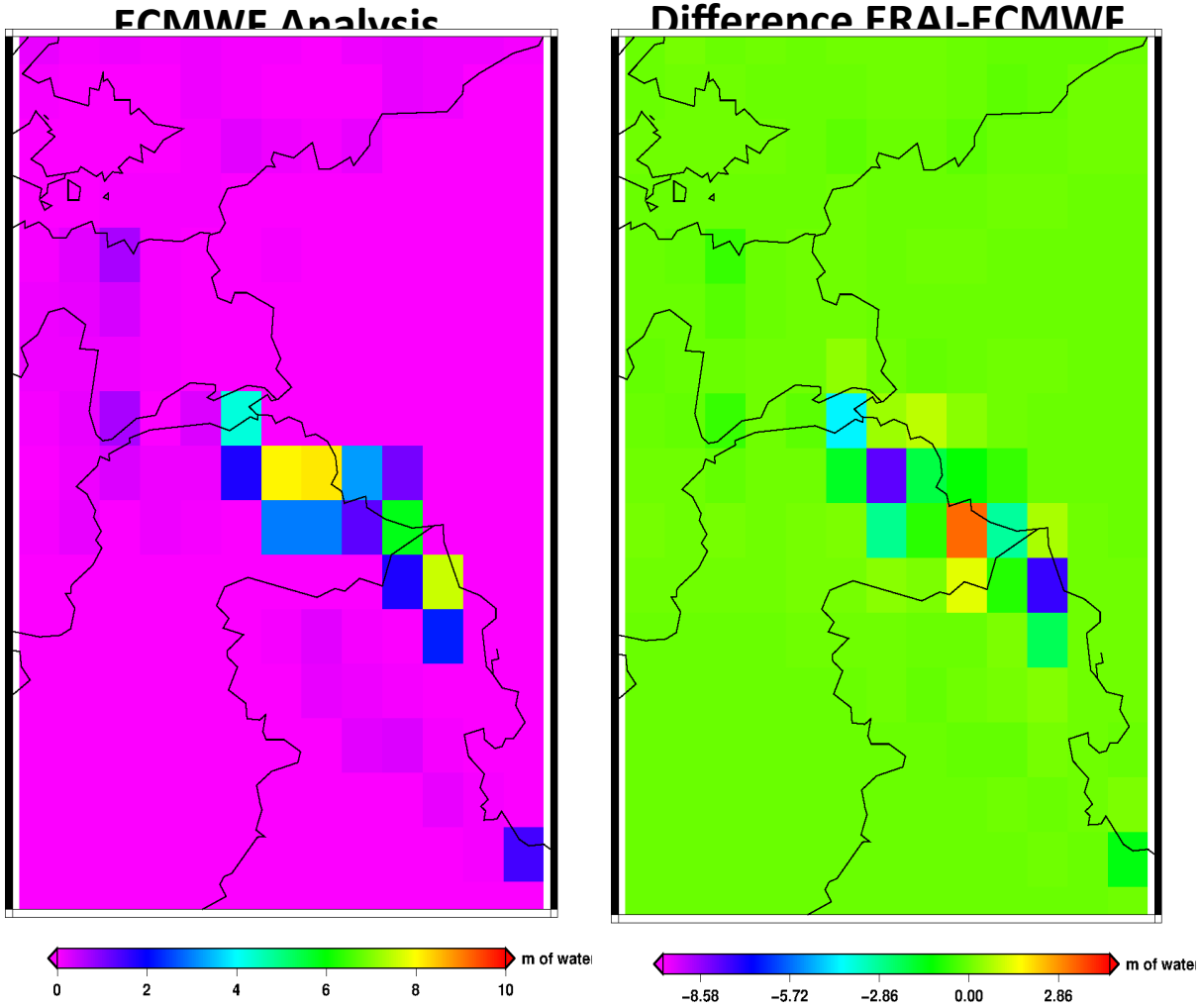






ERA-Interim vs. ECMWF Analysis

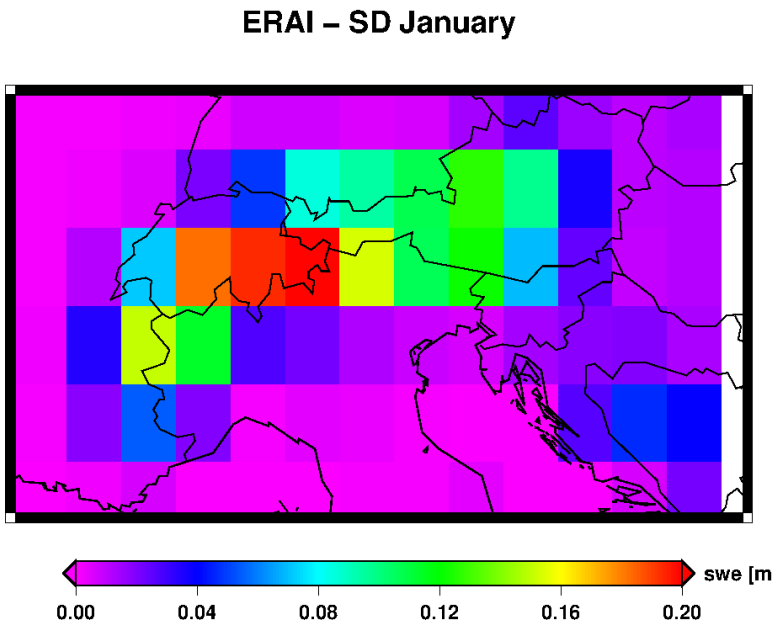
February, 01 2011

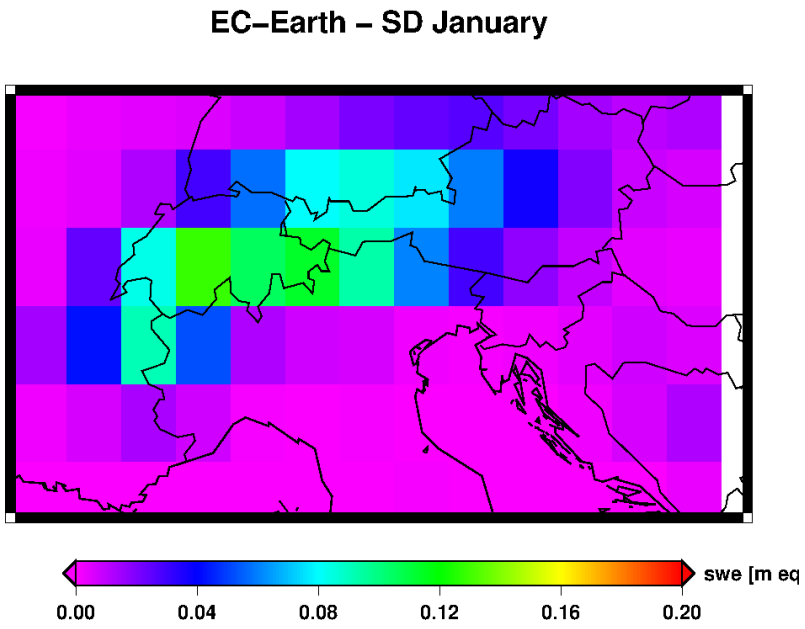


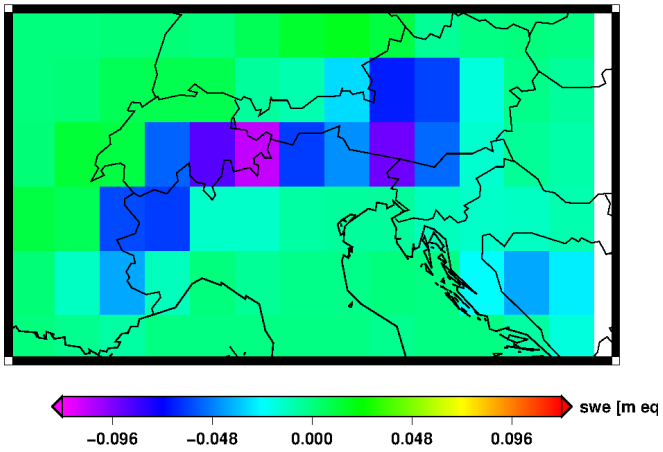
Same order of magnitude

Overall accordance, ERAI tends to underestimate snow depth with respect to ECMWF Analysis

ERA-Interim vs EC-Earth
January, Alps







Comparable snow depth over Alps

EC-Earth underestimates snow depth with respect to ERA-Interim

Conclusions and outlook

- ✓ EC-Earth underestimates snow depth with respect to ERA-Interim, especially over the Baltoro area
- ✓ Further analysis to validate EC-Earth snow depth dataset (i.e. ground observations, gridded products)
- ✓ Comparative analysis of other snow models:
  - ✓ UTOPIA (University of TOrino land Process Interaction in Atmosphere, *Cassardo C., 2006*)
  - ✓ H-Tessel (*Dutra et al., 2010*)
  - ✓ Degree-day snow models
- ✓ The most accurate will be used for future snow projections